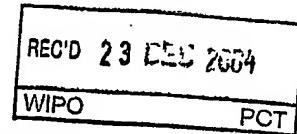


PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 0837RF-H552P	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US03/34946	International filing date (<i>day/month/year</i>) 03 November 2003 (03.11.2003)	Priority date (<i>day/month/year</i>) 01 November 2002 (01.11.2002)
International Patent Classification (IPC) or national classification and IPC IPC(7): B32B 31/00 and US Cl.: 156/91, 92, 148, 393		
Applicant BELL HELICOPTER TEXTRON INC		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of ___ sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of report with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 28 May 2004 (28.05.2004)	Date of completion of this report 09 December 2004 (09.12.2004)
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/ US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Jeff H. Aftergut DEBORAH A. THOMAS PARALEGAL SPECIALIST Telephone No. 571-272-1212 GROUP 1000 <i>DAT</i>

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US03/34946

I. Basis of the report

1. With regard to the elements of the international application:*

 the international application as originally filed. the description:pages 1-16 as originally filedpages NONE, filed with the demandpages NONE, filed with the letter of _____ the claims:pages 17-23, as originally filedpages NONE, as amended (together with any statement) under Article 19pages NONE, filed with the demandpages NONE, filed with the letter of _____ the drawings:pages 1-11, as originally filedpages NONE, filed with the demandpages NONE, filed with the letter of _____ the sequence listing part of the description:pages NONE, as originally filedpages NONE, filed with the demandpages NONE, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

 the language of a translation furnished for the purposes of international search (under Rule 23.1(b)). the language of publication of the international application (under Rule 48.3(b)). the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

 contained in the international application in printed form. filed together with the international application in computer readable form. furnished subsequently to this Authority in written form. furnished subsequently to this Authority in computer readable form. The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished. The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. The amendments have resulted in the cancellation of: the description, pages NONE the claims, Nos. NONE the drawings, sheets/fig NONE5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORTInternational application No.
PCT/US03/34946**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N) Claims 2, 3, 5, 7, 9, 10, 12-44 YES
 Claims 1, 4, 6, 8, 11 NO

Inventive Step (IS) Claims NONE YES
 Claims 1-44 NO

Industrial Applicability (IA) Claims 1-44 YES
 Claims NONE NO

2. CITATIONS AND EXPLANATIONS

Please See Continuation Sheet

INTERNATIONAL PRELIMINARY EXAMINATION REPORTInternational application No.
PCT/US03/34946**Supplemental Box**
(To be used when the space in any of the preceding boxes is not sufficient)**V. 2. Citations and Explanations:**

Claims 1, 4, 6, 8, and 11 lack novelty under PCT Article 33(2) as being anticipated by Carlson et al.

Carlson et al suggested that it was known at the time the invention was made to provide a composite perform having composite fibers extending in the X-Y plane, place a mat of discrete fibers on the composite perform, provide at least one needle having at least one external barb, push the needle through the mat of discrete fibers and the perform generally in the Z-direction such that the barb catches some of the discrete fibers and pulls the discrete fibers through the perform, and retract the needle so that the discrete fibers are retained in the perform, see column 2, lines 25-38, for example. Carlson et al also suggested that the needling operation was repeated in order to provide the desired degree of reinforcement, see column 2, lines 16-20. With regard to claim 4, note that the fibers employed in Carlson et al are carbon (graphite) fibers. Regarding claims 6 and 8, note that the reference suggested various passes of the needling device over the perform to attain the desired end product. Regarding claim 11, note that the perform was impregnated with a resin material and cured to form a carbon-carbon composite material.

Claims 1-15 lack an inventive step under PCT Article 33(3) as being obvious over Carlson et al. While the reference to Carlson et al did not expressly state that the fibers employed in the mat disposed on the perform were formed from glass or polymer fibers, it would have been within the purview of the ordinary artisan to select fibers other than carbon or graphite fibers for the same as a function of the type of reinforcement one desired to attain in the finished assembly. Regarding the exposure of the Z-direction fibers, one skilled in the art would have understood that whether the fibers were exposed or not would have been a function of the type of end product being manufactured and one skilled in the art would have known how to leave the fibers protruding from the surface or how to completely cover the same. It would have been obvious to utilize the techniques of Carlson et al to form a composite perform with Z-direction reinforcement therein wherein the same included various kinds of reinforcing fibers for the Z-direction reinforcement as well as various types of end products wherein the fibers were left to protrude or unprotruding from the surface of the finished assembly.

Claims 12-21 lack an inventive step under PCT Article 33(3) as being obvious over Carlson et al in view of Monget et al. Carlson is discussed above in and applicant is referred to the same for a complete discussion of the reference. The reference to Carlson et al failed to teach the use of the specific backing material utilized in the operation (i.e. the resilient pad or the soluble material). However, the use of a resilient pad to support a prefom in a needling operation was known as evidenced by Monget et al. Note that one skilled in the art would have been expected to select a suitable needling backup material from those commercially available and such would have included the silicon rubber or soluble backup members as claimed. Additionally, the use of a meltable material to hold the perform in place would have been useful as such would have retained the perform in position during the needling operation. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a backup member during a needling operation as suggested by Monget et al in the process of needling a fiber perform material to implant Z-direction reinforcement as suggested by Carlson et al. It should be noted that in Monget et al, the fibers which were disposed through the layers were exposed on the opposite side of the assembly.

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(To be used when the space in any of the preceding boxes is not sufficient)

Claims 22-34 lack an inventive step under PCT Article 33(3) as being obvious over Pannell in view of Carlson et al and Monget et al. Pannell suggested that it was known at the time the invention was made to join two composite performs with Z-direction fiber placement which was used to join the two performs together. The reference failed to teach that one skilled in the art would have utilized the specific technique of needling a mat of discrete fibers into the joint region to join the performs together, however the reference to Carlson et al suggested such a technique as useful for provision of Z-direction reinforcement in a perform. As the reference to Pannell must provide the Z-direction reinforcement somehow, it would have been within the purview of the ordinary artisan to provide for the same by utilizing the techniques of Carlson et al in the operation of Pannell in order to secure two composite performs together with the Z-direction reinforcement. While Carlson et al did not provide for loops of the material extending outwardly from the perform (the z-pins of Pannell extend outward from the surface) needling the assembly such that the loops of the z-direction fibers extend outwardly from the surface was known at the time the invention was made as suggested by Monget et al. To perform the needling in the manner described by Monget et al to form the perform useful for joining to substrates together would have been obvious to one of ordinary skill in the art as it would have provided a suitable means for locking the fibers in place in the z-direction during needling.

Claims 35-44 are an inventive step under PCT Article 33(3) as being obvious over Carlson et al in view of Duval et al. The reference to Carlson et al is discussed above in full detail. The reference suggested that one skilled in the art would have utilized a needling device to insert Z-direction fibers not a perform from a mat of discrete fibers. The reference is silent as to the use of a specific device for performing the operation, however one skilled in the art would have been led to look to the needling art and in particular the art of needling composite perform materials. The reference to Duval et al suggested the specified structure of the apparatus which was used to needle a composite material to make a perform structure. While the reference didn't include a mat of discrete fibers which were needled into the perform to make the Z-direction reinforcement therefrom, the applicant is advised that the use of such mat of discrete fibers with a needling apparatus such as that of Duval et al would have been obvious to one of ordinary skill in the art in light of the teachings of Carlson as Carlson suggested that the mat of discrete fibers would have facilitated provision for the Z-direction reinforcement.

The applicant argues that the reference to Carlson does not anticipate the claimed invention under PCT Article 33(2) because the reference suggested that if a thicker perform was desired than the total length of the z-direction fibers incorporated in the perform that multiple passes would have to be incorporated in the process. However the claims are not limited to a specific thickness for the perform of the process and one skilled in the art would have understood from Carlson that the operation would have been suitable for thin perform manufacture. Additionally, while applicant argues that Carlson is only concerned with interlaminar strength, the claims at hand do not recite anything regarding peel strength, shear strength, or thermal conduction across the assembly interface. As such, the claims at hand again are not commensurate in scope with the arguments.

Regarding Carlson and the rejection under PCT Article 33(3), the applicant argues that the use of glass or polymer fibers is critical to the invention, however the applicant is advised that the claims at hand also include the use of carbon fibers for the z-direction fibers. As such, it would appear to have been within the purview of the ordinary artisan to select from the myriad of reinforcing fibers available to them to reinforce the composite. Polymeric or glass reinforcing fibers were well known in the art and there is no reason to believe would not have operated in the process of Carlson. The applicant argues that there are advantages to using polymer fibers of glass fibers such as very low strength knockdowns; however there is no mention of the same in the claims and as such again the claims are not commensurate in scope with the claimed invention. The applicant is advised regarding the disposing of the fibers such that loops are disposed upon the opposite side of the needling that the reference to Monget et al suggested such needling was feasible and the claims at hand do not recite that the exposed fibers were utilized to bond two preformed together (note that claims 12-21 do not join two components together as claimed in claim 22). The fact that Monget et al does not teach leaving the loops behind to form a bond line is immaterial to the claimed invention in claims 12-21 because the claims do not recite the formation of a bond between two composites with the needled assembly.

Regarding Pannell et al, the applicant argues that the reference employed a z-pin strip to join the layers together while the claimed invention does not utilize a z-pin strip. This is not well taken as the prior art rejection is essentially that one skilled in the art would have had to form the z-pin strip and one skilled in the art would have formed the same utilizing the techniques of Carlson et al and Monget et al. As such, one would have provided loops of material extending from the substrate. Utilizing the loops as the pins of the strip in Pannell would have been obvious to one of ordinary skill in the art.

Childress, referred to in the response, was not applied against the claims.

With regard to Duval et al, it would certainly have been within the purview of the ordinary artisan to select a suitable apparatus for performing the operation of Carlson et al and such would have included the use of the system of Duval et al. One skilled in the art would have understood how to process the material utilizing the device of Duval et al in order to produce a product which was commercially acceptable. While the reference to Duval may have included features which are not present in the claimed invention, it clearly suggested that those skilled in the art of composite manufacture would have known of suitable mechanisms to process the

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(To be used when the space in any of the preceding boxes is not sufficient)

materials according to the techniques suggested by Carlson to obtain an end product suggested by Carlson of composite material.

NEW CITATIONS-----